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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/700,572

04/20/2001

Karl Heinz Munzke

40954/DBP

6028

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7590

07/28/2004

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EXAMINER

STOCK JR, GORDON J

ART UNIT

PAPER NUMBER

2877

DATE MAILED: 07/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/700,572

Applicant(s)

MUNZKE ET AL.

Examiner

Gordon J Stock

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 May 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 12-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 12-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

1. **Claims 1-4 and 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Beaty et al. (5,909,285)** in evidence of **Csipkes et al. (5,729,622)** and **Willoughby, Jr. et al. (5,619,587)**.

As for **claims 1-4 and 6**, Beaty in a three dimensional inspection system discloses the following: a method for detection and checking of geometrical or textural features of an object in various views using an opto-electronic image recording device as well as storage and evaluation unit for image processing and evaluation, wherein quality or state assessment of the object is effected by a comparison with parameters which are predetermined in respect of the individual features, wherein a plurality of partial images of the object are substantially recorded by means of a number of image-recording devices and beam-deflection means which number is smaller than the plurality of partial images, and at least partially optically assembled at the same time to form an overall image which shows all views and in which the boundaries of the partial images can be recognized, and the overall image is evaluated separately for checking individual features in the boundaries of the partial images, characterized in that the regions of the overall image, which show side views on to the object locations at which the object comes very close to a support surface are ascertained by analysis of the gray value distributions; subsequently the light quantity which passes through between the object and the support surface and which is reflected in the pixels as an intensity value is detected (as apparent from the light passing through between the support surface and the object of Figs. 3a and 3b); the local light quantity pattern characterizing the width of a gap between the object and the support surface may be determined using subpixel processing; whereas, the gap may be stated as the z distance between the reticle

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plane and the object (col. 5, lines 35-40; col. 7, lines 23-27; Figs. 3a and 3b with one support configuration of Fig. 9a); partial images are assembled optically and recorded by precisely one image-recording device; in the overall image the regions of the partial images are so positioned and identified, using the storage and evaluation unit that they can be associated with individual views; in that at least one additional step the scene is recorded with a reference object which has predetermined parameters in respect of the features and the corresponding overall image is put in the storage and evaluation unit for comparison and calibration purposes; integrated into the overall image is a representation of the side of the object (Fig. 1a, 1b; cols. 3 and 4; col. 5, lines 20-40; col. 6, lines 25-40; col. 7, lines 35-65; col. 8, lines 1-35).

As for using gray scales values to determine the gap distance, z value, as well as positions close to the support surface, Beaty suggests this for subpixel methodology such as in Figs. 10a-10d may be used in position determination (col. 7, lines 20-30). Therefore, it would be obvious that a gap width determination, a z value, may be determined through gray values, for x, y, and z positions may be determined through subpixel processing that comprises gray scales, differing intensity values for pixels.

As for calibrating with an algorithm Beaty states that a plurality of equations and a calibration procedure are used (cols. 5-6). Beaty mentions gradient image processing (col. 8, lines 1-35). Csipkes in an inspection system teaches using an algorithm in gradient processing during calibration (col. 21, lines 20-45); Willoughby in a system for measuring thickness teaches using algorithms in defining profiles that are used in calibration (col. 8, lines 55-67; col. 9, lines 1-30). Therefore, it would be obvious to one skilled in the art at the time the invention was made

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that a predetermined algorithm was used, for gradient processing was performed to provide data concerning the edges of the object.

2. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Beaty et al. (5,909,285)** in view of **Csipkes et al. (5,729,622)** and **Willoughby, Jr. et al. (5,619,587)** further in view of **Suzuki et al. (5,299,308)**.

As to **claim 5**, **Beaty** discloses everything as above (see **claim 1**). He is silent concerning convolution filters, but teaches using subpixel processing (Figs. 10a-10d). **Suzuki** in a graphic data processing apparatus teaches using convolution filtering in subpixel edge processing to eliminate high frequency components (col. 5, lines 50-67). Therefore, it would be obvious to one skilled in the art at the time the invention was made to have the method include convolution filters to eliminate high frequency components from the subpixel processing.

3. **Claims 7, 8, 12, 13** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Beaty et al. (5,909,285)** in view of **Lebeau et al. (5,563,703)** further in view of **Vodanovic et al. (5,406,372)**.

As for **claims 7 and 8**, **Beaty** discloses the following: an apparatus for detection and checking of geometrical features of an object in various views; comprising an opto-electronic image-recording device and a storage and evaluation unit for image processing and image evaluation wherein there are provided optical means for beam deflection, by means of which a plurality of partial images of the object are recorded by a number of image-recording devices, which number is smaller than the plurality of partial images, and are at least partially assembled optically at the same time to form an overall image which shows all views and in which the boundaries of the partial images are recognizable, characterized in that there is

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provided a flat support surface for the object and the beam-deflection means are arranged substantially in the plane of the support surface in such a way that there is a view parallel to the support surface; provided a single image recording device relative to which the object is positioned in such a way that it fills only a partial region of its field of view; beam deflection devices are disposed in the remaining field of view which project side views of the object on to the image recording device (Fig. 1a, Fig. 1b, Fig. 1c; cols. 3 and 4; col. 5, lines 20-40; col. 6, lines 25-40; col. 7, lines 35-65; col. 8, lines 1-35). As for coplanarity of a plurality of parts, Beaty is silent. However, Lebeau in an inspection apparatus teaches that coplanarity is a parameter that must be met to ensure quality semiconductor devices (col. 1, lines 10-25). It would have been obvious to one skilled in the art at the time the invention was made to have the inspection device comprise checking of coplanarity to ensure the quality of the semiconductor device.

As for lens arrangement means, Beaty in view of Lebeau is silent. However, Vodanovic in an inspection system teaches having a lens arrangement with differing imaging scales between the side view and plan view, a macrolens versus a telecentric lens (Fig. 5). Therefore, it would be obvious to have the system comprise lens arrangement means relating to beam deflection means, for side views of inspection regions comprise macrolenses and plan views comprise telecentric lenses.

As for **claims 12 and 13**, Beaty in view of Lebeau and Vodanovic disclose everything as above (**claim 7** above). In addition, Beaty discloses a diffuser for producing a uniform light flux under the object which is arranged behind projecting parts of the object and permits a view on the side of the object remote from the image recording device (Fig. 9a).

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4. **Claims 7-10, 12-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Linker (**WO 98/04882**) (cited by applicant) in view of **Vodanovic et al. (5,406,372)**.

As for **claims 7-8**, Linker in a vision inspection/sorter module; comprising an opto-electronic image-recording device and a storage and evaluation unit for image processing and image evaluation wherein there are provided optical means for beam deflection, by means of which a plurality of partial images of the object are recorded by a number of image-recording devices, which number is smaller than the plurality of partial images, and are at least partially assembled optically at the same time to form an overall image which shows all views and in which the boundaries of the partial images are recognizable, characterized in that there is provided a flat support surface for the object and the beam-deflection means are arranged substantially in the plane of the support surface in such a way that there is a view parallel to the support surface; provided a single image recording device relative to which the object is positioned in such a way that it fills only a partial region of its field of view; beam deflection devices are disposed in the remaining field of view which project side views of the object on to the image recording device; permitting checking of coplanarity of a plurality of parts of the object (Figs. 4a-4c; Figs. 10 and 11; pages 11-16).

As for lens arrangement means, Linker is silent. However, Vodanovic in an inspection system teaches having a lens arrangement with differing imaging scales between the side view and plan view, a macrolens versus a telecentric lens (Fig. 5). Therefore, it would be obvious to have the system comprise lens arrangement means relating to beam deflection means, for side views of inspection regions comprise macrolenses and plan views comprise telecentric lenses.

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As for **claim 9** Linker in view of Vodanovic discloses everything as above (see **claim 7 or 8 above**), Linker also discloses that the beam deflection means are displaceable, for there are adjustment means for positioning the imaging housings to accommodate IC devices of different thickness (page 12, lines 4-6).

As for **claim 10** Linker in view of Vodanovic discloses everything as above (see **claim 7 or 8 above**), Linker also discloses that the beam deflection means have a light guide (Fig. 9; page 13, lines 4-5).

As for **claims 12 and 13**, Linker in view of Vodanovic discloses everything as above (see **claim 7 above**). Linker also discloses diffusive mirrors and prisms (page 13, lines 5-20).

As for **claim 14**, Linker in view of Vodanovic discloses everything as above (see **claim 7 above**). Linker also discloses the image recording device and the storage and evaluation unit are integrated to form a structural unit (Fig. 2).

#### ***Response to Arguments***

5. Applicant's arguments, see Remarks, filed May 14, 2004, with respect to the rejection(s) of **claim(s) 1-4, 6** under 35 U.S.C. 102(b) with **Schilling et al. ("High-Precision and Versatile Optical Measurement ... Viewpoint")** and claim 5 under 35 U.S.C. 103(a) with **Schilling et al. ("High-Precision and Versatile Optical Measurement....Viewpoint")** in view of **Suzuki et al. (5,299,308)** have been fully considered and are persuasive. However, the remarks in regards to the rejection of claims 1-4, 6 in view of **Beaty et al. (5,909,285)** in view of **Csipkes et al. (5,729,622)** and **Willoughby, Jr. et al. (5,619,587)** and claim 5 further in view of **Suzuki et al. (5,299,308)** have not been found persuasive. As for Beaty not detecting locations with gray values, see rejection above. Beaty uses many types of support surfaces such as Fig. 9a;



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the x, y, z positions of the object may be determined through subpixel processing that comprises using gray values (col. 7, lines 20-35; col. 8, lines 5-25). Therefore, it would be obvious to one skilled in the art that locations of the object close to the support surface such as the reticle plane may be determined through gray scale values, for all positions, x, y, z positions, may be determined using subpixel processing that comprises using gray scale values. And therefore the light and light intensity passing therethrough between the support surface, the reticle plane, and the object is used to determine the z value, gap between the reticle plane and the object, that determines a position of the object in relation to the reticle plane (light intensity passing therethrough as seen in Figs. 3a and 3b).

As for the allowable subject matter as set forth in the prior office action, the Examiner apologizes for the inconvenience caused by the grounds of rejection for **claims 7-10, 12-14**, but after performing an updated search, the Examiner found grounds of rejection for **claims 7-10, 12-14**.

### *Conclusion*

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: U.S. Patent 6,055,055 to Toh U.S. Patent 6,141,040 to Toh

### *Fax/Telephone Numbers*

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

- 1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and
- 2) Should be unsigned by the attorney or agent.

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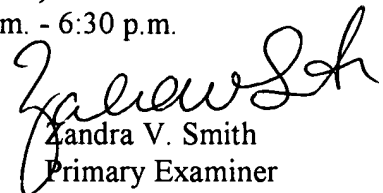
This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

*Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (703) 872-9306*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431. The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

gs

July 20, 2004

  
Zandra V. Smith  
Primary Examiner  
Art Unit 2877